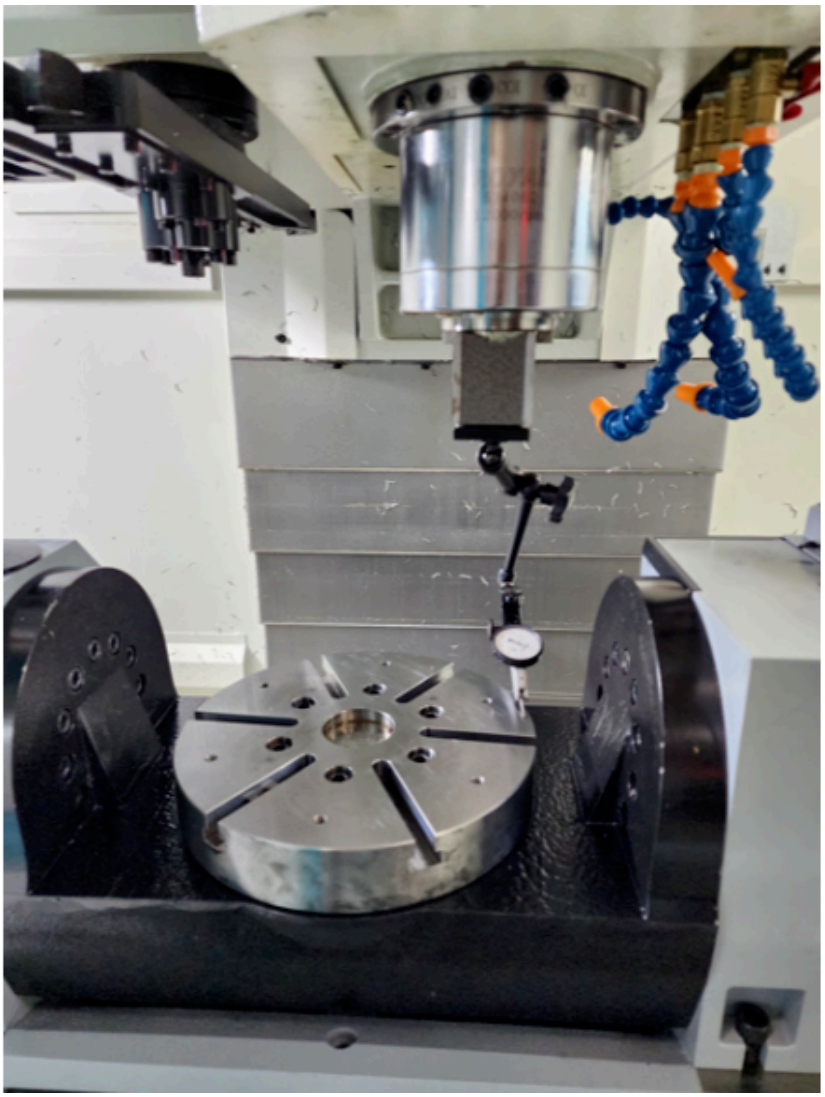
Trunnion Mechanical Alignment

Align a 3+2 trunnion on a VMCsi: A-axis zero, parallelism and platter geometry.

Written By: Ryan Levrini



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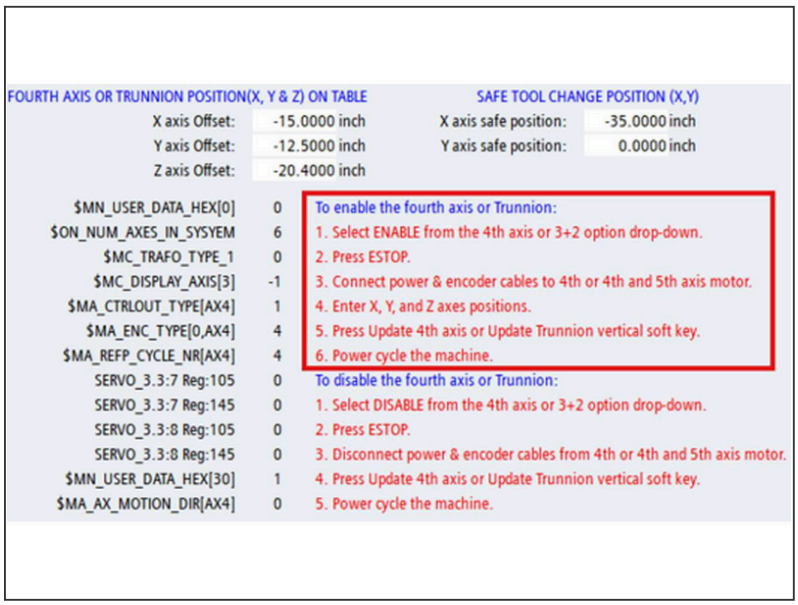
INTRODUCTION

Align a 3+2 trunnion on a VMCsi: enable it, zero and square the A axis, reference the A-axis encoder, and check platter geometry.

Take an archive before you start: Archive Current System.

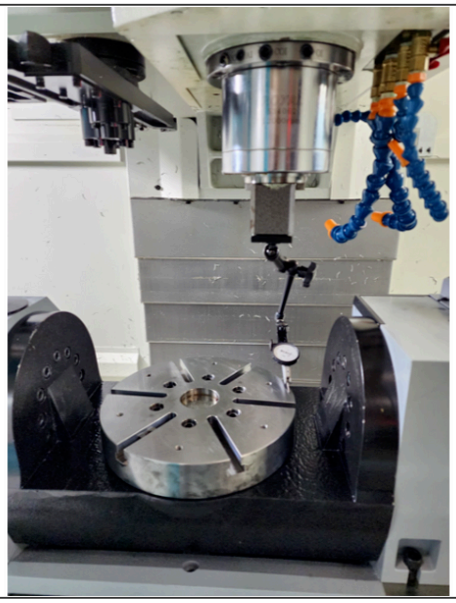
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Step 1 — Enable Trunnion



- If the Trunnion is not enabled, follow the procedure on the **[TrakMT Options]** screen.
- **[Setup] → [TrakMT Options]**
- If the trunnion is being installed or its bolts are loose:
  - Position the trunnion in the correct mounting location.
  - Hand tighten the main mounting bolts so the trunnion is secured but still adjustable.
  - Lightly snug the adjustment block to hold position without fully locking it.

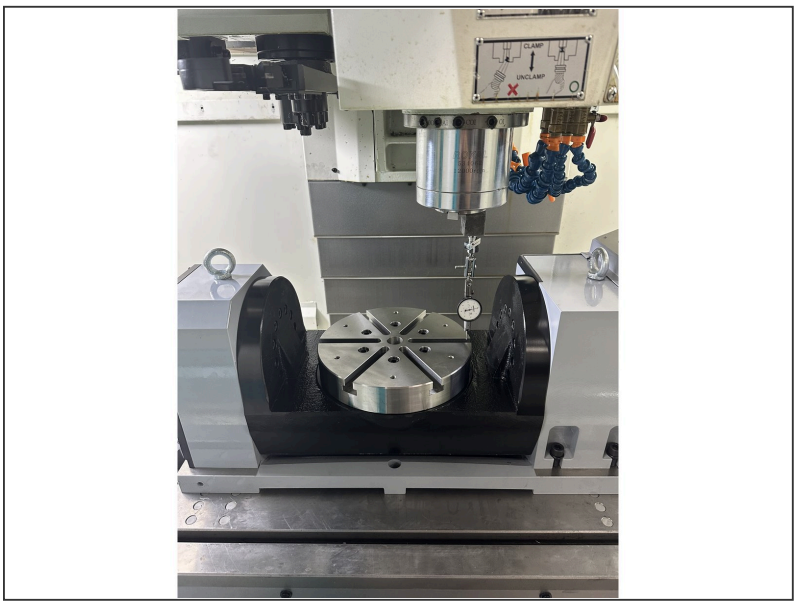
Step 2 — A-Axis Zeroing Along the Y-Axis



- Set the X-Axis to 12 o’clock and reset the A-Axis to 0.
- Position the dial indicator ¼” from the back edge of the platter using the Y-Axis.
- Using the Z-Axis in fine increments, preload the indicator to 0.004”, then set the dial pointer to 0.
- Move the Y-Axis toward 6 o’clock until the indicator is ¼” from the near edge of the platter.
- Check the dial indicator readings at the 12 o’clock and 6 o’clock positions:
  - If both readings are 0 and the A-axis display on the control panel reads 0.000°, skip to **Step 5** (the A-axis is already referenced correctly).
  - If they differ, proceed to **Step 3**.

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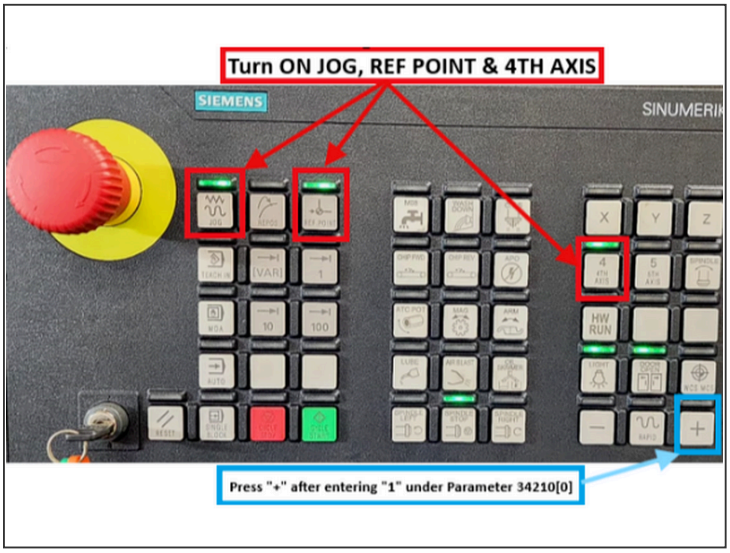
Step 3 — Adjusting A-Axis for Parallelism

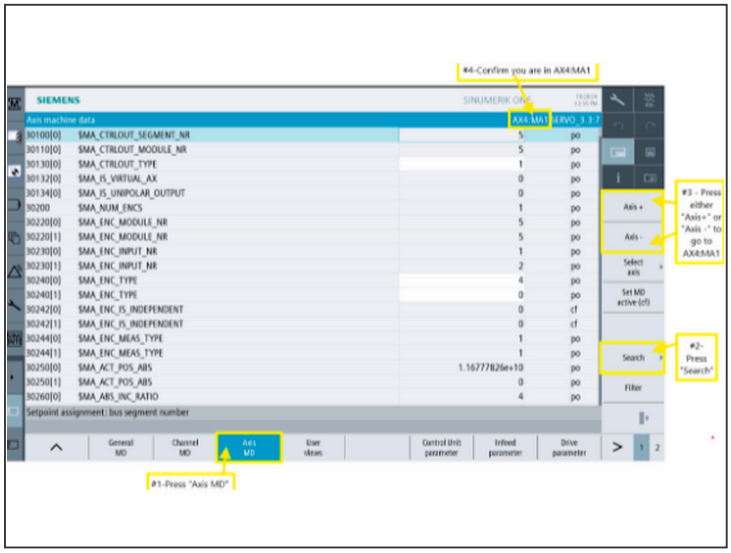


- Tilt the A-axis in fine increments until the dial indicator is midway between the start and end readings.
  - ⓘ For example, if the start reading is 0 and the end reading is 0.002”, adjust the A-axis until the indicator reads 0.001”.
- Reset the dial indicator to 0 and move the Y-axis back to 12 o’clock on the rotary table.
- Check if the dial indicator still reads 0 (or within 0.0001”).
- If the readings at both 12 o’clock and 6 o’clock are 0, the A-Axis zero position is found.
- To set this position as the new 0, proceed to **Step 4** for A-Axis referencing.

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Step 4 — Reference Absolute Encoder for A-Axis





ⓘ Step 4 is required only if you are adjusting and found 4th-Axis zero position from Step 3.

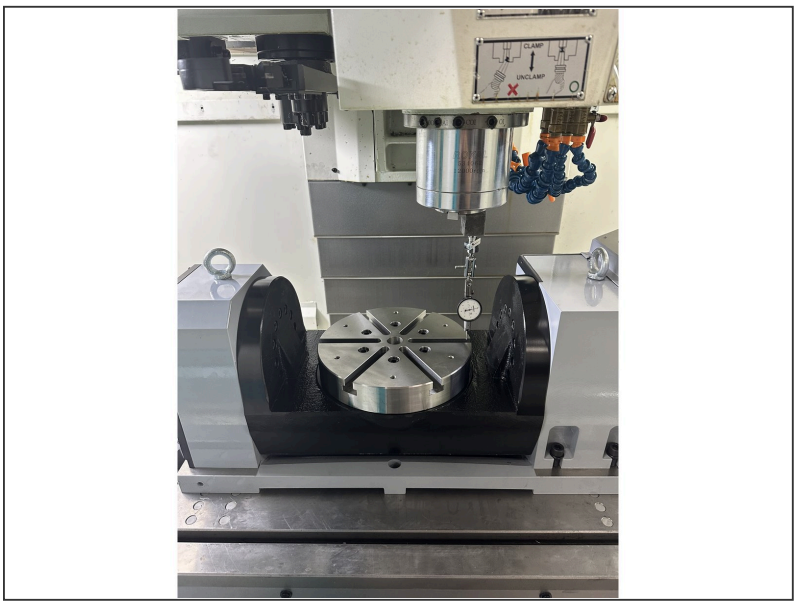
- Set Manufacture Password.
- Go to **[Setup]** → **[Mach. Data]** → **[Axis MD]** → **[Select Axis]** → **[AX4:MA1]** → **[Search]** for **34210**.
- Turn on the **[JOG]**, **[REF. POINT]**, and **[4th Axis]** buttons on the MCP.
- Change Parameter 34210 to "**1**"
- Press the "**[+]**" button on the MCP. The value for Parameter **34210**[0] should change from "1" to "2" automatically.
  - ⓘ The changing of the value to "2" means that the referencing process is complete.
- For Reference: VMCsi - Reset Machine Absolute Zero for Each Axis

Step 5 — Platter Geometry Check Along the X-Axis in the Horizontal Plane



- Move the dial indicator to 3 o’clock on the platter, positioning it ¼” from the edge.
- Preload the indicator to 0.004” and set the dial pointer to 0.
- Sweep the X-axis from 3 o’clock to 9 o’clock across the platter.
- Observe the indicator reading at 9 o’clock to determine if deviation exceeds **0.0008”**.
  - If adjustment is required, loosen the cradle support bolts on the high side to lower the cradle into the correct position.
  - If that does not correct the issue, shim the trunnion on the low side using twice the measured difference. After shimming, restart the process from **Step 2**.

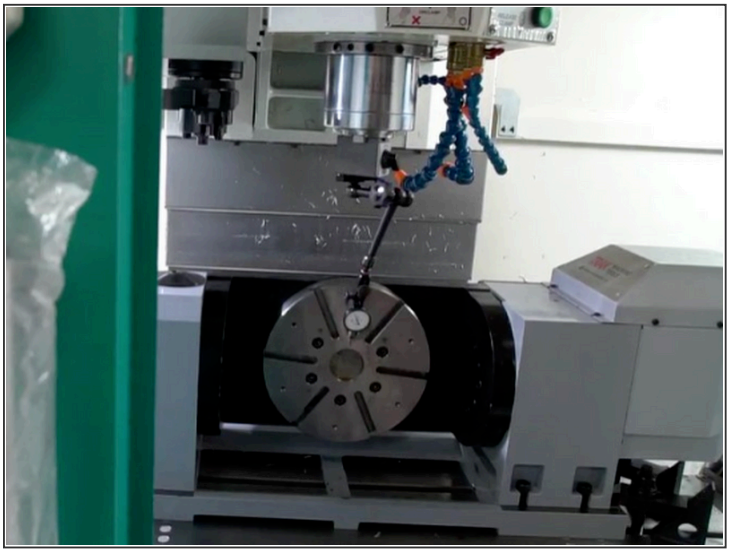
Step 6 — Align C-Axis T-Slot Parallel to X-Axis

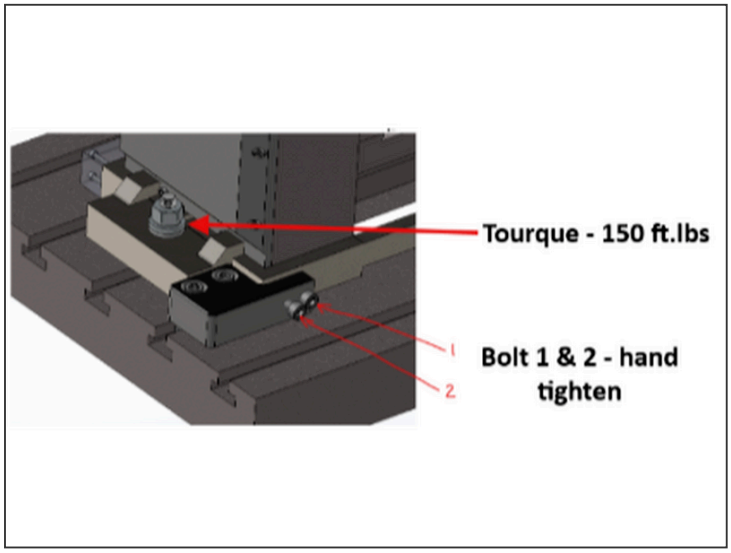


- Move A-axis to 0.000° (flat), mount a dial indicator to the spindle, and preload it on one edge of the platter slot.
- Jog the X-axis across the slot (right to left) and rotate the C-axis until both ends read the same value. Record this C-axis position.
- Tilt the A-axis to +90° or -90° (depending on Trunnion orientation) and repeat to obtain a second C-axis value.
- Reverse the sign of both values, e.g., 0.082 → (–0.082), then calculate their average.
- Go to **[Setup]** → **[Mach. Data]** → **[Axis MD]** → **[Select Axis]** → **[AX5:MC1]** → **[Search]** for 34090[0].
  - If 34090[0] is 0.000, enter the averaged result directly.
  - If 34090[0] already contains a value, subtract the old value from the new averaged result and enter that correction.
- Press **[Reset (po)]** to apply the new reference offset.

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Step 7 — Tilt A-Axis Zeroing Along the X-Axis in the Vertical Plane





- Tilt the A-axis to +90° or -90°, depending on the Trunnion's orientation along the X-axis.
- Set up the dial indicator as shown in the image.
- In JOG mode, move the X and Z axes to position the indicator pointer vertically at the centerline of the rotary table, ¼" from the rightmost edge (3 o'clock position).
- Slowly move the Y-axis to preload the indicator to 0.004", then set the dial to zero.
- Move the X-axis to the opposite (9 o'clock) side of the rotary table.
- If the readings differ, loosen the left clamp and adjust the left side of the assembly along Y to correct.
- Use adjustment screws 1 and 2 to fine-tune until deviation is **≤ 0.0001"**.
- Once aligned, tighten all clamps and torque both anchor blocks to **150 ft.lbs**.

Step 8 — Rotary C-Axis Calibration (Axial, Radial & Skew)



- Position the dial gauge pointer as shown in the image.
- Preload the indicator to 0.004” and set the dial pointer to 0.
- Slowly rotate the platter 360 degrees, observing the + and - variations from zero.
- Calculate the Total Indicator Reading (TIR) by finding the difference between the maximum and minimum values.
- Ensure TIR does not exceed **0.002”**.
- If readings exceed the limit, inspect the platter mounting surface and flatness.

Step 9 — Trunnion Calibration



- Continue to Trunnion Calibration